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FOREST INVENTORY STATISTICS
PETERSBURG WORKING CIRCLE
NORTH TONGASS NATIONAL FOREST

Forest Survey Report No. 3
by
A. P. Caporaso

(In-Service Use Only)

Forest Service
U. S. Department of Agriculture

Alaska Forest Research Center
R. F. Taylor, Forester in Charge
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FOREWORD

This is the third in a series of reports on the forest area and timber volume of Southeast Alaska. It is a product of the Forest Survey of Southeast Alaska carried on by the Alaska Forest Research Center in cooperation with the Timber Management Division of Region 10 of the U. S. Forest Service.

The resource facts contained herein provide reliable data on a timber management unit basis for the Region's long-range plans and formulation of policies for timber production and for their guidance of forest industry development. These facts are also additive to the nation-wide survey being conducted by the Forest Service's Division of Economics Research.

Funds for the conduct of the survey were supplied by both Region 10 and the Forest Survey. The aerial photos used were loaned by the Region. Field work was accomplished during the field season of 1956.

From initial planning to final compilation, these people worked on the inventory:

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Acknowledgement is also made of cooperation from personnel of the Regional Office and the Forest Supervisor's staff of the North Tongass National Forest.

HIGHLIGHTS

Area

Forest area

Within the exterior boundaries of the Petersburg Working Circle about 72 percent of the 3,286,600 acres is forested. 1,029,200 acres or about 44 percent of the 2,356,600 acres of forest land qualifies as productive, or commercial forest land. Although slightly more than one million acres is productive forest land about 28-percent or 289,600 acres is presently inaccessible or inoperable due to current logging practices, economic climate and topography in southeast Alaska. (Re-stocking and poletimber areas surrounded by accessible sawtimber stands are considered as accessible).

Ownership

Ninety-nine percent of the commercial forest land area is administered by the Forest Service. At the time that the Petersburg Working Circle was inventoried there were no areas of commercial forest land reserved from timber cutting. All of the 289,600 acres of inaccessible commercial forest land is administered by the Forest Service.

Stand-size classes

About ninety-six percent of the 1,018,200 acres of National Forest commercial forest land area is occupied by sawtimber stands. Of the 976,000 acres of sawtimber stands only about two percent is in young - growth sawtimber stands.

Although there are 952,900 acres of commercial old-growth sawtimber stands on National Forest land only about 71 percent is presently accessible. In addition to the 681,400 acres of accessible old-growth sawtimber stands there are about 47,200 acres of young-growth stands within the accessible zone. This only amounts to about six percent of the total accessible commercial forest area.

Forest types

About 57 percent of the National Forest commercial forest land area is occupied by the hemlock type. The hemlock - Sitka spruce type ranks next with 23 percent followed by Sitka spruce with 11 percent and cedar with 7 percent. The remaining area is composed of hardwoods, primarily black cottonwood.

Timber Volume

About 32 billion board feet of merchantable National Forest timber is located in old-growth sawtimber stands. This amounts to about 97 percent of the total board foot volume. About 70 percent of this volume is estimated to be presently accessible. Scattered throughout the accessible zone, however, are small timbered areas of questionable economic value at the present time. These areas bear primarily Alaska-cedar and western redcedar stands and also include stands of mature sawtimber which net less than 16,000 board feet per acre.

Most of the 33 billion board feet of National Forest timber is in hemlock trees. About 68 percent is hemlock followed by Sitka spruce with 26 percent and cedar with 5 percent. The remaining one percent is composed of cottonwood, red alder and lodgepole pine. Practically, all of the cottonwood is located in the Stikine River valley.

About 38 percent of the board foot volume or 12.7 billion feet is found in trees in the 21-inch to 30-inch diameter class group. In descending order about 26 percent is found in the 11 to 20-inch d.b.h. group, 22 percent in the 31 to 40-inch group and the remaining 14 percent in the 41-inch and larger diameter class group.

Old-growth accessible and inaccessible sawtimber stands are quite similar in that the average net volume per acre of the former is about 33,000 b.f. and for the latter about 35,000. There is some variation in species distribution in that 67 percent of the cedar and virtually all of the cottonwood is in the accessible zone.

Defect in old-growth sawtimber trees is excessive. Slightly more than 50 percent of the gross b.f. volume of live merchantable cedar sawtimber trees is in cull material followed by hemlock with 22 percent and Sitka spruce with 9. About 10 percent of the hemlock trees are complete culls or unmerchantable and they contain 14 percent of the gross board foot volume of the working circle. About 35 percent of the total volume of all sawtimber trees is unmerchantable. By major species, about 37 percent of the hemlock and 8 percent of the Sitka spruce is lost due to rot in merchantable and unmerchantable trees exclusive of breakage.

Estimates of mortality and volume by log grades were not made due to the light sampling system. Estimates will be made at the Regional level to provide more reliable data.

Summary table of highlights, commercial forest land,
Petersburg Working Circle, 1956

	<u>Commercial Forest Land</u>			
	<u>Accessible</u>		<u>Inaccessible</u>	
	<u>Area</u>	<u>Net volume</u>	<u>Area</u>	<u>Net volume</u>
	<u>Acres</u>	<u>M. Cu. Ft.</u>	<u>Acres</u>	<u>M. Cu. Ft.</u>
Total growing stock	723,600	4,912,135	289,600	2,109,753
Total sawtimber volume ^{1/}		4,440,568		1,933,449

<u>National Forest:</u>	<u>MBF Scribner</u>		<u>MBF Scribner</u>	
Old-growth sawtimber	681,400	22,613,370	271,500	9,593,772
Young-growth sawtimber	17,300	668,530	5,300	198,768

<u>Percent of Total Bd. Ft. Volume by Species</u>		
<u>Species</u>	<u>Accessible</u>	<u>Inaccessible</u>
Spruce	13.23	7.68
Hemlock	43.45	19.36
Alaska cedar	1.59	1.32
Red cedar	1.82	0.56
Other	0.62	0.17

^{1/} Includes only volume of sawlog portion of the tree.

Table 1.—Land area by major classes and timber management block,
combined ownerships, Petersburg Working Circle, 1956

	Forest Land 1/					
Block	Commercial accessible	Commercial inaccessible	Noncomm.	Non- forest land 2/		Total
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>		<u>Acres</u>
1. Farragut	28,750	17,800	49,600	71,000		167,150
2. Thomas	85,150	43,800	129,400	443,300		701,650
3. Bradfield	57,950	30,500	121,500	295,100		505,050
4. Turnabout	30,200	8,100	56,600	2,600		97,500
5. Petersburg	68,250	21,700	104,200	9,200		203,350
6. Kake	36,550	21,300	120,800	600		179,250
7. Duncan	31,200	23,500	185,000	3,700		243,400
8. Zarembo	73,300	22,100	106,900	15,500		217,800
9. Wrangell	141,100	39,200	209,000	54,500		443,800
10. Anita Bay	40,350	6,100	48,500	14,700		109,650
11. Kadake	54,400	16,000	37,200	1,200		108,800
12. Tebenkof	73,400	30,000	99,800	16,800		220,000
13. Rocky Pass	19,000	9,500	58,900	1,800		89,200
Total	739,600	289,600	1,327,400	930,000		3,286,600
Percent of Total	22.50	8.81	40.39	28.30		100.00

^{1/} There are no areas of reserved commercial forest land in the Petersburg Working Circle.

^{2/} Includes 8,300 acres of water in areas from 10 to 40 acres in size that would be classified by the Bureau of Census as land but are classified as water according to Survey standards of area classification. Does not include tidewater.

Table 2.—Area of commercial forest land by ownership class and block,
Petersburg Working Circle, 1956

Block	Ownership Class			Total
	National Forest	BLM	Private	
	Acres	Acres	Acres	Acres
1. Farragut	46,300	--	250	46,550
2. Thomas	128,100	--	850	128,950
3. Bradfield	88,000	--	450	88,450
4. Turnabout	38,300	--	--	38,300
5. Petersburg	83,800	6,000	150	89,950
6. Kake	57,800	50	--	57,850
7. Duncan	54,700	--	--	54,700
8. Zarembo	95,400	--	--	95,400
9. Wrangell	108,300	--	--	180,300
10. Anita Bay	43,200	3,250	--	46,450
11. Kadeke	70,400	--	--	70,400
12. Tebenkof	103,400	--	--	103,400
13. Rocky Pass	28,500	--	--	28,500
Total	1,018,200 <u>1/</u>	9,300 <u>2/</u>	1,700 <u>2/</u>	1,029,200

1/ Includes 289,600 acres of commercial inaccessible forest land.

2/ All commercial accessible forest land.

Table 3.—Net volume of live sawtimber on commercial forest land by ownership class and block, Petersburg Working Circle, 1956

Block	Ownership Class				Total
	National				
	Forest	BLM	Private		
	Thousand BF Scribner	Thousand BF Scribner	Thousand BF Scribner	Thousand BF Scribner	
1. Farrugut	1,470,699	---	8,296		1,478,995
2. Thomas	3,618,161	---	28,206		3,646,367
3. Bradfield	2,732,325	---	14,933		2,747,258
4. Turnabout	1,286,869	---	---		1,286,869
5. Petersburg	2,818,075	199,104	4,978		3,022,157
6. Kake	1,963,574	1,659	---		1,965,233
7. Duncan	1,857,052	---	---		1,857,052
8. Zarembo	3,207,616	---	---		3,207,616
9. Wrangell	5,928,328	---	---		5,928,328
10. Anita Bay	1,405,897	107,848	---		1,513,745
11. Kadake	2,338,151	---	---		2,338,151
12. Tebenkof	3,507,232	---	---		3,507,232
13. Rocky Pass	966,802	---	---		966,802
Total	33,100,781	308,611	56,413		33,465,805

Table 4.—Area of National Forest commercial forest land by block,
Petersburg Working Circle, 1956

Block	Commercial Forest Land		Total
	Accessible	Inaccessible	
	Acres	Acres	Acres
1. Farragut	28,500	17,800	46,300
2. Thomas	84,300	43,800	128,100
3. Bradfield	57,500	30,500	88,000
4. Turnaboué	30,200	8,100	38,300
5. Petersburg	62,100	21,700	83,800
6. Kake	36,500	21,300	57,800
7. Duncan	31,200	23,500	54,700
8. Zarembo	73,300	22,100	95,400
9. Wrangell	141,100	39,200	180,300
10. Anita Bay	37,100	6,100	43,200
11. Kadake	54,400	16,000	70,400
12. Tebenkof	73,400	30,000	103,400
13. Rocky Pass	19,000	9,500	28,500
Total	728,600	289,600	1,018,200
Percent of Total	71.56	28.44	100.00

Table 5.—Net volume of live sawtimber on National Forest commercial forest land by block, Petersburg Working Circle, 1956

Block	Commercial Forest Land		
	Accessible	Inaccessible	Total
	Thousand BF Scribner	Thousand BF Scribner	Thousand BF Scribner
1. Farrugut	928,321	542,378	1,470,699
2. Thomas	2,259,042	1,359,119	3,618,161
3. Bradfield	1,761,589	970,736	2,732,325
4. Turnabout	999,925	286,944	1,286,869
5. Petersburg	2,051,276	766,799	2,818,075
6. Kake	1,210,608	752,966	1,963,574
7. Duncan6	1,025,054	831,998	1,857,052
8. Zarembo	2,426,309	781,307	3,207,616
9. Wrangell	4,551,013	1,377,315	5,928,328
10. Anita Bay	1,216,217	189,680	1,405,897
11. Kadake	1,797,189	540,962	2,338,151
12. Tebenkof	2,444,564	1,062,668	3,507,232
13. Rocky Pass	628,457	338,345	966,802
Total	23,299,564	9,801,217	33,100,781
Percent of total	70.39	29.61	100.00

Table 6.—Area of National Forest commercial forest land by stand-size class and block, Petersburg Working Circle, 1956

Block	Stand-size class and symbol						Total
	Old	Young					
	growth	growth		Seedlings			
	saw-	saw-	Pole-	&	Non-		
	timber	timber	timber	saplings	stocked		
	(4)	(3)	(2)	(1)	(5)		
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Accessible							
1. Farragut	27,650	350	—	250	250		28,500
2. Thomas	59,600	7,250	750	8,100	8,600		84,300
3. Bradfield	51,750	1,100	750	2,000	1,900		57,500
4. Turnabout	29,950	150	—	100	—		30,200
5. Petersburg	60,600	1,100	—	400	—		62,100
6. Kake	36,050	350	—	100	—		36,500
7. Duncan	30,400	400	—	400	—		31,200
8. Zarembo	69,450	1,900	1,500	450	—		73,300
9. Wrangell	136,950	1,300	—	2,600	250		141,100
10. Anita Bay	36,600	50	—	450	—		37,100
11. Kadeke	53,950	150	—	300	—		54,400
12. Tebenkof	69,700	3,500	—	200	—		73,400
13. Rocky Pass	18,750	200	—	50	—		19,000
Total	681,400	17,800	3,000	15,400	11,000		728,600
Percent of Total	93.52	2.44	0.41	2.12	1.51		100.00
Inaccessible							
1. Farragut	15,800	—	—	2,250	250		17,800
2. Thomas	35,950	2,300	750	3,000	1,800		43,800
3. Bradfield	27,500	—	—	1,500	1,500		30,500
4. Turnabout	8,100	—	—	—	—		8,100
5. Petersburg	21,700	—	—	—	—		21,700
6. Kake	20,550	750	—	—	—		21,300
7. Duncan	23,500	—	—	—	—		23,500
8. Zarembo	21,350	750	—	—	—		22,100
9. Wrangell	38,950	—	—	—	250		39,200
10. Anita Bay	5,350	—	—	750	—		6,100
11. Kadeke	15,250	—	750	—	—		16,000
12. Tebenkof	29,250	750	—	—	—		30,000
13. Rocky Pass	8,750	750	—	—	—		9,500
Total	271,500	5,300	1,500	7,500	3,800		289,600
Percent of Total	93.75	1.83	.52	2.59	1.31		100.00

Table 7.--Net volume of live sawtimber on National Forest commercial forest land by stand-size class and block, Petersburg Working Circle, 1956

	Stand-size class and symbol ^{1/}						
	Old	Young					
	growth	growth		Seedlings			
	saw-	saw-	Pole-	&	Non-		
	timber	timber	timber	saplings	stocked	Total	
	(4)	(3)	(2)	(1)	(5)		
	MBF	MBF	MBF	MBF	MBF	MBF	
	Scribner	Scribner	Scribner	Scribner	Scribner	Scribner	
	Accessible						
1. Farrugut	916,011	12,207	--	86	17	928,321	
2. Thomas	1,980,919	271,822	2,870	2,875	556	2,259,042	
3. Bradfield	1,717,007	40,865	2,870	724	123	1,761,589	
4. Turnabout	994,790	5,108	--	27	--	999,925	
5. Petersburg	2,003,527	42,593	--	156	--	2,051,276	
6. Kake	1,198,076	12,508	--	24	--	1,210,608	
7. Duncan	1,009,590	15,324	--	140	--	1,025,054	
8. Zarembo	2,354,902	71,251	--	156	--	2,426,309	
9. Wrangell	4,495,470	48,866	5,739	921	17	4,551,013	
10. Anita Bay	1,214,070	1,991	--	156	--	1,216,217	
11. Kadake	1,791,106	5,972	--	111	--	1,797,189	
12. Tebenkof	2,312,726	131,760	--	78	--	2,444,564	
13. Rocky Pass	620,176	8,263	--	18	--	628,457	
Total	22,613,370	668,530	11,479	5,472	713	23,299,564	
Percent of							
Total	97.05	2.87	.05	.03	1/	100.00	
	Inaccessible						
1. Farrugut	541,555	--	--	807	16	542,378	
2. Thomas	1,269,871	85,186	2,870	1,077	115	1,359,119	
3. Bradfield	970,099	--	--	538	99	970,736	
4. Turnabout	286,944	--	--	--	--	286,944	
5. Petersburg	766,799	--	--	--	--	766,799	
6. Kake	724,571	28,395	--	--	--	752,966	
7. Duncan	831,998	--	--	--	--	831,998	
8. Zarembo	752,911	28,396	--	--	--	781,307	
9. Wrangell	1,377,299	--	--	--	16	1,377,315	
10. Anita Bay	189,411	--	--	269	--	189,680	
11. Kadake	538,092	--	2,870	--	--	540,962	
12. Tebenkof	1,034,273	28,395	--	--	--	1,062,668	
13. Rocky Pass	309,949	28,396	--	--	--	338,345	
Total	9,593,772	198,768	5,740	2,691	246	9,801,217	
Percent of							
Total	97.88	2.03	.06	.03	1/	100.00	

^{1/} Less than .01 percent.

Table 8.—Area of National Forest commercial forest land by forest type and block, Petersburg Working Circle, 1956

	Forest Type and Symbol						
		Hemlock					
		Sitka	Sitka				
Block	Hemlock	spruce	spruce	Cedar	Hardwoods	Total	
	(H)	(H-S)	(S)	(C)	(D)		
	Acres	Acres	Acres	Acres	Acres	Acres	
Accessible							
1. Farragut	16,200	8,300	2,300	1,700	—	28,500	
2. Thomas	30,900	19,700	16,100	3,200	14,400	84,300	
3. Bradfield	34,400	12,600	6,600	3,900	—	57,500	
4. Turnabout	19,600	5,000	1,800	3,800	—	30,200	
5. Petersburg	38,900	14,400	4,300	4,500	—	62,100	
6. Kake	23,900	7,400	2,200	3,000	—	36,500	
7. Duncan	15,000	10,800	2,500	2,900	—	31,200	
8. Zarembo	45,800	17,100	5,500	4,900	—	73,300	
9. Wrangell	80,900	35,800	13,300	11,100	—	141,100	
10. Anita Bay	21,200	10,200	3,100	2,600	—	37,100	
11. Kadake	34,200	12,400	4,500	3,300	—	54,400	
12. Tebenkof	47,500	14,000	4,300	7,600	—	73,400	
13. Rocky Pass	12,300	3,600	1,000	2,100	—	19,000	
Total	420,800	171,300	67,500	54,600	14,400	728,600	
Percent of Total	57.76	23.51	9.26	7.49	1.98	100.00	
Inaccessible							
1. Farragut	10,300	2,450	4,300	750	—	17,800	
2. Thomas	16,500	12,400	13,000	1,100	800	43,800	
3. Bradfield	12,200	9,800	7,500	1,000	—	30,500	
4. Turnabout	4,800	1,850	1,000	450	—	8,100	
5. Petersburg	14,100	4,000	2,500	1,100	—	21,700	
6. Kake	14,200	3,500	2,700	900	—	21,300	
7. Duncan	14,500	4,800	3,400	800	—	23,500	
8. Zarembo	15,600	3,200	2,100	1,200	—	22,100	
9. Wrangell	22,600	8,200	5,100	3,300	—	39,200	
10. Anita Bay	2,800	2,300	700	300	—	6,100	
11. Kadake	8,300	4,650	2,450	600	—	16,000	
12. Tebenkof	17,200	5,750	3,450	3,600	—	30,000	
13. Rocky Pass	7,300	1,000	700	500	—	9,500	
Total	160,400	63,900	48,900	15,600	800	289,600	
Percent of Total	55.39	22.06	16.88	5.39	0.28	100.00	

Table 9.--Net board foot volume of live sawtimber on National Forest commercial forest land by species and block, Petersburg Working Circle, 1956

		Species ^{1/}					
		Sitka	Alaska	Western			
Block	Hemlock	spruce	cedar	redcedar	Other ^{2/}	Total	
	MBF	MBF	MBF	MBF	MBF	MBF	
	Scribner	Scribner	Scribner	Scribner	Scribner	Scribner	
Accessible							
Farragut	636,212	242,540	21,257	24,280	4,032	928,321	
Thomas	1,544,838	535,299	45,978	52,748	80,179	2,259,042	
Bradfield	1,206,924	456,217	39,845	45,746	12,857	1,761,589	
Turnabout	685,390	263,019	23,079	26,362	2,075	999,925	
Petersburg	1,405,757	533,552	46,740	53,370	11,857	2,051,276	
Kake	829,737	316,999	27,797	31,750	4,325	1,210,608	
Duncan	702,489	267,347	23,423	26,754	5,041	1,025,054	
Zarembo	1,662,459	624,779	54,634	62,404	22,033	2,426,309	
Wrangell	3,119,010	1,191,254	104,295	119,597	16,857	4,551,013	
Anita Bay	833,710	321,595	28,243	32,249	420	1,216,217	
Kadake	1,231,891	473,477	41,553	47,465	2,803	1,797,189	
Tebenkof	1,674,351	615,752	53,655	61,288	39,518	2,444,564	
Rocky Pass	430,718	164,153	14,388	16,435	2,763	628,457	
Total	15,963,486	6,005,983	524,887	600,488	204,760	23,299,564	
Inaccessible							
Farragut	367,641	144,935	24,912	4,874	16	542,378	
Thomas	921,106	343,168	58,414	11,663	24,768	1,359,119	
Bradfield	658,100	259,182	44,624	8,731	99	970,736	
Turnabout	194,577	76,585	13,200	2,582	--	286,944	
Petersburg	519,966	204,659	35,273	6,901	--	766,799	
Kake	510,498	194,399	33,330	6,521	8,218	752,966	
Duncan	564,178	222,060	38,272	7,488	--	831,998	
Zarembo	529,716	201,963	34,634	6,776	8,218	781,307	
Wrangell	933,947	367,601	63,355	12,396	16	1,377,315	
Anita Bay	128,577	50,685	8,713	1,705	--	189,680	
Kadake	366,836	144,297	24,752	5,077	--	540,962	
Tebenkof	720,507	277,058	47,577	9,308	8,218	1,062,668	
Rocky Pass	229,344	83,736	14,257	2,790	8,218	338,345	
Total	6,644,993	2,570,328	441,313	86,812	57,771	9,801,217	

^{1/} Block volumes derived on the assumption that species distribution is similar for all blocks within an accessibility class.

^{2/} Includes lodgepole pine, red alder, and black cottonwood.

Table 10a.--Net volume of all timber on accessible commercial Forest land by class of material and species group, combined ownership, Petersburg Working Circle, 1956

Class of Material	Total	Softwoods	Hardwoods
	Thousand cubic feet	Thousand cubic feet	Thousand cubic feet
Growing stock			
Sawtimber trees			
Sawlog portion	4,440,568	4,413,344	27,224
Upper stem portion	194,009	189,576	4,433
Total	4,634,577	4,602,920	31,657
Poletimber trees	277,558	277,558	1/
Total growing stock	4,912,135	4,880,478	31,657
Other material			
Sound cull trees	9,017	9,017	--
Rotten cull trees	119,959	119,776	183
Hardwood limbs	467	--	467
Salvable dead	21,466	21,466	--
Total "other material"	150,909	150,259	650
Total, all timber	5,063,044	5,030,737	32,307

1/ Although some hardwood poletimber trees do occur none, however, were encountered on the sample field locations.

Table 10b.--Net volume of all timber on inaccessible commercial forest land by class of material and species group, combined ownerships, Petersburg Working Circle, 1956

Class of material	Total	Softwoods	Hardwoods
	<u>Thousand cubic feet</u>	<u>Thousand cubic feet</u>	<u>Thousand cubic feet</u>
Growing stock			
Sawtimber trees			
Sawlog portion	1,933,449	1,925,591	7,858
Upper stem portion	83,993	82,714	1,279
Total	2,017,442	2,008,305	9,137
Poletimber trees	92,311	92,311	1/
Total growing stock	2,109,753	2,100,616	9,137
Other material			
Sound cull trees	3,266	3,266	--
Rotten cull trees	41,907	41,907	--
Hardwood limbs	135	--	135
Salvable dead	19,004	19,004	--
Total "other material"	64,312	64,177	135
Total all timber	2,174,605	2,164,793	9,272

1/ Although some hardwood poletimber trees do occur none, however, were encountered on the sample field locations.

Table 11.--Net board foot volume of live sawtimber on commercial forest land by species and diameter class groups, combined ownerships, Petersburg Working Circle, 1956

Species	Diameter Class Group				Total volume:	Percent
	11.0" to 20.9"	21.0" to 30.9"	31.0" to 40.9"	41.0" d.b.h. and larger	by	by
	d.b.h.	d.b.h.	d.b.h.		Species	Species
	MBF Scribner	MBF Scribner	MBF Scribner	MBF Scribner	MBF Scribner	
Sitka Spruce	913,432	2,205,079	2,184,753	3,367,151	8,670,415	25.91
Hemlock ^{1/}	6,945,755	9,777,820	4,985,250	1,149,739	22,858,564	68.31
Alaska Cedar	567,941	347,590	58,880	--	974,411	2.91
Red Cedar	249,371	250,700	137,597	59,005	696,673	2.08
Lodgepole Pine	8,843	2,646	--	--	11,489	0.03
Red Alder	2,298	--	--	--	2,298	0.01
Cottonwood	45,837	144,649	61,469	--	251,955	0.75
Total volume by d.b.h. classes	8,733,477	12,728,484	7,427,949	4,575,895	33,465,805	100.00
Percent by d.b.h. classes	26.10	38.03	22.20	13.67	100.00	

^{1/} Western hemlock and mountain hemlock combined.

Table 12.--Average net volume per acre in live merchantable trees on commercial forest land by land type and stand-size class, Petersburg Working Circle, 1956

Land type	Stand-size class				
	Old growth saw-timber (4)	Young growth saw-timber (3)	Pole-timber (2)	Seedlings & saplings (1)	Nonstocked (5)
1. Accessible					
B.F. Scribner	33,184	37,560	3,796	356	65
Cubic foot	6,901	7,041	1,717	182	18
2. Inaccessible					
B.F. Scribner	35,338	37,560	3,796	356	65
Cubic foot	7,619	7,041	1,717	182	18

Note--Average net volume per acre for stand-sizes 1, 2, 3 and 5 obtained from a very small sample. Necessary to combine accessible and inaccessible field plots.

Cubic foot volume includes volume in both live merchantable pole-timber and saw-timber trees to a 4-inch top d.i.b.

Table 13.--Defect volume in old-growth sawtimber stands by major species,
Petersburg Working Circle, 1956

	:Gross volume: :of all live : :trees, cull : : and : :merchantable:	:Gross volume: : of : : live cull : : trees : :	: Volume of : : defect in : : merchantable: : trees :	: Breakage : : volume in : : merchantable: : trees :	: Net : merchantable : volume :
	:MBF Scribner:	:MBF Scribner:	:MBF Scribner:	:MBF Scribner:	:MBF Scribner:
Hemlock	: 35,025,427 :	: 4,597,803 :	: 6,611,486 :	: 1,548,023 :	: 22,858,564 :
Spruce	: 10,514,413 :	: 592,798 :	: 892,379 :	: 457,105 :	: 8,670,415 :
Western red cedar	: 2,754,248 :	: 1,175,958 :	: 839,364 :	: 48,195 :	: 696,673 :
Alaska-cedar	: 2,740,272 :	: 648,705 :	: 1,058,941 :	: 67,473 :	: 974,411 :
Total	: 51,034,360 :	: 7,015,264 :	: 9,402,170 :	: 2,120,796 :	: 33,200,063 :

Table 14.--Proportion of defect and breakage in old-growth sawtimber stands
by major species, Petersburg Working Circle, 1956

Class of material	:Western : :hemlock : :Percent	: Sitka : : spruce : :Percent	: Western : : red cedar : : Percent	: Alaska- : cedar : : Percent
<u>Merchantable sawtimber trees</u>	:	:	:	:
1. Proportion of total gross bd. ft. volume of live merchantable trees in rotten cull material.	: 22 :	: 9 :	: 53 :	: 51 :
2. Breakage in live merchantable sawtimber trees	: 6 :	: 5 :	: 6 :	: 6 :
<u>All live trees</u>	:	:	:	:
1. Proportion of all live sawtimber trees that are cull trees	: 10 :	: 5 :	: 30 :	: 19 :
2. Proportion of total gross bd. ft. volume in cull trees	: 13 :	: 6 :	: 43 :	: 24 :
3. Proportion of total gross bd. ft. volume of working circle lost due to rot and breakage	: 37 :	: 18 :	: 75 :	: 65 :

APPENDIX

EXPLANATION OF TERMS

Land-Use Classes

Forest land.--Includes (a) lands that are at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking, and which has not been developed for other use. (Forested tracts and islands of less than 10 acres and isolated strips of timber less than 120 feet wide are excluded.)

1. Commercial forest land - Forest land producing or capable of producing usable crops of industrial wood.
 - a. Commercial accessible - Commercial forest land presently accessible and economically available now and which has not been withdrawn from use.
 - b. Commercial inaccessible - Commercial forest land presently inaccessible and economically unavailable now and not withdrawn for specified purposes. Changing economic climate and improving logging methods probably will make portions available for development in the future.
 - c. Commercial reserved - Commercial forest land withdrawn from timber utilization through statute, ordinance or administrative order. (Classed as noncommercial productive reserved by the Forest Survey).
2. Noncommercial forest land - Forest land incapable of producing usable industrial wood because of adverse site conditions and not withdrawn for specified purposes.
3. Noncommercial reserved forest land - Noncommercial forest land withdrawn for specified purposes through statute, ordinance or administrative order.

Nonforest land.--Includes land which has never supported forest growth; land from which the forest has been removed to less than 10 percent stocking and has been developed for other use, such as agricultural, residential, or industrial; all land in thickly populated urban and suburban areas; house sites; trade and manufacturing sites; lighthouse reserves; and water classified by the Bureau of the Census as land, i.e., less than 40 acres in size. Glaciers, ice fields, marsh land above mean high tide, permanent brush fields, muskegs less than 10 percent stocked to trees of any size and barren mountain tops are examples of lands which have never supported forest growth.

Forest types

Commercial forest types

Forest types are classified on the basis of the predominant species or species group that accounts for the major portion of the stand in terms of net board foot volume for sawtimber, cubic volume for poles and number of trees for seedling-sapling stands.

Sitka spruce.--Forests in which Sitka spruce is predominant.

Hemlock-Sitka spruce.--Forests in which 50 percent or more of the stand is hemlock but in which Sitka spruce makes up 30 to 49 percent of the stand.

Hemlock.--Forests predominately hemlock except when Sitka spruce comprises 30 to 49 percent of the stand.

Cedar.--Forests predominately western redcedar or Alaska-cedar, singly or in combination.

Hardwood.--Forests predominately cottonwood or red alder, singly or in combination.

Noncommercial forest types

Scrub.--Forests characterized by open stands of stunted, limby, defective trees of no present or prospective value. All tree species may be present. Mature stands will net less than 8000 board feet per acre (Scribner rule).

1. Stands occupy swamp-like soils and contain a dense understory of blueberry and other shrubs.
2. Stands at the upper limits of tree growth.
3. Stands within the altitudinal range of merchantable timber but occupying sites too rocky and too sterile to produce merchantable timber.

Class of Timber

Sawtimber trees.--Live trees of commercial species at least 11.0-inches d.b.h. with at least 25 percent of their gross board foot volume free from rot or other defect and that contain at least one merchantable sawlog. A merchantable sawlog is not less than 16 feet long, at least 6-inches d.i.b. at the small end for softwoods and 8-inches d.i.b. for hardwoods, and which after deductions for defect contains a net scale of 33-1/3 percent. However, for any log to be merchantable it must contain at least 20 board feet (Scribner rule). Merchantable height was based on the number of 16 foot logs in softwoods to a top d.i.b. of 40 percent of d.b.h., except in the case of small trees where the minimum top is 6 inches. For hardwoods it was the number of 8 foot logs to a minimum top of 8-inches d.i.b. for small trees and 40 percent of d.b.h. for large trees.

Poletimber trees.--Live trees 5.0-inches to, but not including, 11.0-inches d.b.h. These trees are of sufficiently good form and condition to indicate that they will grow into merchantable sawtimber trees.

Seedling and sapling trees.--Live trees of commercial species less than 5.0-inches d.b.h. and of sufficiently good form and vigor to indicate that they will grow into merchantable sawtimber trees.

Cull trees.--Live trees 5.0-inches d.b.h. and over that do not qualify as sawtimber or poletimber trees due to poor form, limbiness, rot or other defect.

1. Rotten cull trees contain excessive decay.
2. Sound cull trees have excessive crook, sweep or large limbs.

Salvable dead trees.--Standing dead sawtimber-size trees containing at least one merchantable sawlog and containing at least 50 percent of the tree gross board foot volume in sound material.

Hardwood limbs.--Limbs of hardwood sawtimber trees and sawtimber-size cull hardwood trees to a minimum diameter of 4.0-inches inside bark.

Stand-size Classes

Sawtimber stands.--Forest stands in which the minimum volume for coniferous types is 8,000 net board feet (Scribner) per acre in merchantable trees 11.0-inches and larger. For hardwood sawtimber stands the minimum volume is 4,000 net board feet (Scribner) per acre.

1. Old-growth.--Sawtimber stands in which the majority of volume is in sawtimber trees more than 150 years of age.
2. Young-growth.--Sawtimber stands in which the majority of volume is in sawtimber trees less than 150 years of age.

Poletimber.--Stands failing to meet the sawtimber stand specification, but at least 10 percent stocked with poletimber and larger trees, and with at least half the minimum stocking in poletimber trees.

Seedling and sapling.--Stands not qualifying as either sawtimber or poletimber, but having at least 10 percent stocking of trees of commercial species and with at least half the minimum stocking in seedlings-and-saplings.

Nonstocked and other areas.--Commercial forest land not qualifying for any other class.

Volume Estimates

Sawtimber volume.--Net volume in board feet, Scribner rule, of that portion of live sawtimber trees between stump and the upper limit of merchantability for sawlogs. Volume deductions were made for defects and breakage. Cull factors for hemlock, spruce and cedar were obtained from Station Paper No. 6, Alaska Forest Research Center. Cull for other species and breakage were cruiser's estimates.

Cubic-foot volume:

Growing stock.--Net volume in cubic feet of live merchantable sawtimber trees and live poletimber trees of commercial species from stump to a minimum 4.0-inch top (of central stem) inside bark.

All timber volume.--Net volume in cubic feet of live poletimber trees, live and salvable dead sawtimber trees and cull trees of commercial species from stump to a minimum 4.0-inch top inside bark. Includes also the volume of all hardwood limbs to a minimum diameter of 4.0-inches inside bark.

SPECIES TALLIED ^{1/}

The following commercial tree species were tallied in the Petersburg Timber Management Unit. Other tree species of minor importance may occur in this area, but unless they were tallied on the field plots they were not included in the following list.

Softwoods:	Sitka spruce	- <u>Picea sitchensis</u>
	Hemlock	
	Western hemlock	- <u>Tsuga heterophylla</u>
	Mountain hemlock	- <u>Tsuga mertensiana</u>
	Alaska-cedar	- <u>Chamaecyparis nootkatensis</u>
	Western red-cedar	- <u>Thuja plicata</u>
	Lodgepole pine	- <u>Pinus contorta</u>
Hardwoods:	Red alder	- <u>Alnus rubra</u>
	Black cottonwood	- <u>Populus trichocarpa</u>

FOREST SURVEY PROCEDURES

Area Estimate

The photo point sampling technique on 100 percent aerial photo coverage was used to obtain the various area statistics. A series of five sample plots were systematically located on each effective 1:40,000.

^{1/} Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U. S. Dept. Agr., Agr. Handbook 41, 472 pp. 1953.

aerial photo of the unit. The photo plots that were established were sufficient to meet the requirements of an allowable sampling error of 3 percent of commercial forest land in terms of one standard error.

Each photo plot was then stereoscopically examined and classified as to forest or nonforest. The classification for each photo plot was determined on the basis of the 10-acre area including and immediately surrounding the plot. Plots classified as forest were then transferred to 18° oblique 1:20,000 aerial photos as this photo scale is better suited for more intensive forest examination. Next, the forest plots were classified as to commercial or noncommercial. Finally, the commercial forest plots were stratified by accessibility, forest type, stand-size and density classes. This procedure is known as stratification. The classified plots of each block were then summarized by stratum.

A sample of the plots were randomly selected and field checked. Field classifications were checked against the original photo classification for any differences in interpretation. The field check data was used to adjust the photo classification data for all of the plots in the survey unit if any differences occurred.

The detailed area data from the point samples was then expanded to the unit level. First, the known gross area of the unit was divided by the total number of photo plots to determine the number of acres represented by each. Then, the area for each stratum was a result of the product of the number of plots and the area represented by a plot.

To determine the accuracy of the office photo classification a sample of photo plots was checked in the field. A predetermined number of photos were selected at random and all of the plots on each photo, called a cluster, were examined. The number of photo clusters examined was determined by the formula: 1/

$$\left(\frac{s_{Paf}}{P_{af}} \right)^2 = \frac{\sum_{i=1}^k N_{if} (1-P_{if})}{\left(\sum_{i=1}^k n_{if} \right)^2} + \left[C^2 n'_{if} + C^2 n'_{if} - 2r(n'_{if})(n_{if}) C n'_{if} C n_{if} \right] \left[\frac{k-m}{k} \right] \frac{1}{m}$$

1/ Formula recommended by Roy Chapman, statistician, Washington office.

in which:

m = number of clusters to be checked

$\frac{S_{Paf}}{P_{af}}$ = relative error of proportion in commercial forest

k = total number of photos to give complete coverage

n_i = number of points examined in the i -th cluster

n_{if} = number of points classed as commercial forest land

$C_{n_{if}}$ = coefficient of variation of the n_{if}

n'_{if} = number of points examined in the field

P_{if} = proportion in commercial forest land

$C'_{n_{if}}$ = coefficient of variation of the n'_{if}

$r(n'_{if})(n_{if})$ = correlation coefficient between n_{if} and n'_{if}

Areas determined by photo-interpretation are corrected by applying a factor or ratio as determined from the comparison of photo and field classification of the random sample selected for field checking. A total of ~~443~~ 663 photo classifications were checked in the field.

Volume Estimate

A portion of the photo plots classified as commercial forest land were randomly selected for field examination. At the field locations, survey crews collected such data as species, diameters, merchantable heights, defect, mortality, stand-size class, forest type, etc., on three plots each one-fifth acre in size at two chain intervals.

The collected data was recorded in numerical code and sent to the Data Processing Unit at the California Forest and Range Experiment Sta. Data was compiled by IBM machines following the detailed procedures contained in "Plan for Compilation of the Alaska Forest Survey by the IBM Method". Briefly the procedure is as follows: All of the data recorded for each tree is punched on individual tree cards by location. Then the proper cull factor is applied to each tree. The trees are then sorted and data compiled by various classes such as by species, by 10-inch d.b.h. classes, by stand-size classes, by accessibility classes, etc. The tree volumes are then expanded to a per acre basis and per acre breakage factors by species applied to obtain net volume per acre. Net volumes per acre are then applied to area by classes to obtain class totals by timber management blocks.

Sufficient plots were selected at random to attain a specified level of statistical accuracy. The survey was designed for maximum efficiency in estimating total volume to meet the requirements of the Timber Management Division of Region 10 and the national survey. The allowable error for Region 10 requirement is 5 percent of total board foot volume per unit and for the national survey 10 percent per one billion cubic feet of growing stock for the Coastal Alaska sub-region.

The number of commercial forest land ground plots selected at random was determined by using the formula:

$$E^2 = \frac{C^2}{n} + \frac{q}{mp} \quad \frac{1/}{}$$

where: E = allowable error
 C = coefficient of variation
 n = number of ground plots
 m = number of photo plots
 p = proportion of photo plots on commercial forest land
 q = proportion of photo plots on nonforest and noncommercial forest land

A total of 129 photo plots were examined on the ground.

Sample locations examined by timber management block, Petersburg Working Circle, 1956

Block	: Photo plots	: Ground Locations	: Check plots
1. Farragut	: 221	: 5	: 39
2. Thomas	: 928	: 15	: 147
3. Bradfield	: 668	: 9	: 80
4. Turnabout	: 129	: 5	: 19
5. Petersburg	: 269	: 13	: 51
6. Kake	: 237	: 8	: 15
7. Duncan	: 322	: 7	: 61
8. Zarembo	: 288	: 10	: 59
9. Wrangell	: 587	: 24	: 104
10. Anita Bay	: 145	: 6	: 16
11. Kadake	: 144	: 9	: 17
12. Tebenkof	: 291	: 16	: 43
13. Rocky Pass	: 118	: 2	: 12
Total	: 4,347	: 129	: 663

1/ Formula recommended by Floyd Johnson, Statistician, Pacific Northwest Forest and Range Experiment Station.

ACCURACY OF THE ESTIMATES

Errors which affect the accuracy of the area and volume estimates in this report may arise from two sources:

1. Non-sampling errors.--These are human mistakes in judgment, measurement, recording, or arithmetic. There is no practical method of finding out just how often such errors occur. These errors are kept to a minimum, however, by a diligent effort to maintain a high degree of accuracy in the collection and compilation of data and closely checking all phases of the work.
2. Sampling errors.--These errors arise from using sampling procedures rather than making a 100 percent inventory. These errors can be measured. They are the only measurable errors involved in computing the reliability of the estimates.

Accuracy of the Forest-area Estimates

Forest-land class	:	All ownership	:	Sampling
	:	Area	:	error
		<u>Acres</u>		<u>Percent</u>
Commercial accessible		739,600		± 2.9
Commercial inaccessible		239,600		± 4.3
Total commercial		1,029,200		± 2.3
Noncommercial		1,327,400		± 1.9

The probabilities are two out of three that the actual commercial forest land area is within ± 2.3 percent of the estimated area.

The sampling error for total commercial forest land was calculated from the formula:

$$SE = \frac{\sqrt{\frac{PQ}{n}}}{P}$$

P = proportion of commercial forest land

Q = 1 - P

n = total number of photo plots

Sampling errors of National Forest commercial forest land area by timber management blocks were calculated by the formula:

$$SE_a = \frac{SE_A}{\sqrt{\frac{a}{A}}}$$

SE_a = sampling error of any block

SE_A = sampling error of total CFL of the unit

A = total area of CFL in unit

a = area of CFL in any TM block

: Area Sampling Error,				
: National Forest Commercial Forest Land				
	: Accessible	: Inaccessible	: Total CFL	
	: Percent	: Percent	: Percent	
1. Farragut	: 13.7	: 17.1	: 10.7	
2. Thomas	: 7.9	: 10.9	: 6.4	
3. Bradfield	: 9.5	: 13.2	: 7.7	
4. Turnabout	: 13.2	: 25.7	: 11.8	
5. Petersburg	: 9.2	: 15.5	: 7.9	
6. Kake	: 12.1	: 15.8	: 9.5	
7. Duncan	: 13.0	: 14.8	: 9.8	
8. Zarembo	: 8.5	: 15.5	: 7.4	
9. Wrangell	: 6.1	: 11.6	: 5.4	
10. Anita Bay	: 11.9	: 29.6	: 11.1	
11. Kadake	: 9.9	: 18.1	: 8.7	
12. Tebenkof	: 8.5	: 13.2	: 7.1	
13. Rocky Pass	: 16.6	: 22.9	: 13.7	

With each subdivision of the unit total, the percentage error increases so that small acreages may have large errors and therefore indicate only relative magnitudes.

Accuracy of the Timber Volume Estimates

Commercial forest	: Sawtimber	
	: Volume	: Sampling error
	: M Bd. Ft. Scribner	: Percent
Accessible	23,299,564	6.1
Inaccessible	9,801,217	9.4
Total	33,100,781	5.1

The probabilities are two out of three that the actual sawtimber board-foot volume is within ± 5.1 percent of the estimated total volume.

The sampling error for total volume was calculated from the formula:

$$E^2 = \frac{C^2}{n} + \frac{q}{mp}$$

E = sampling error

C = coefficient of variation

n = total No. of ground plots in any class

m = total No. of photo plots

p = proportion of photo plots on commercial forest land

q = 1 - P

Sampling errors of volume on National Forest commercial forest land by timber management blocks were calculated from the formula:

$$SE_V = \frac{SE_v}{\sqrt{\frac{v}{V}}}$$

SE_V = sampling error of total volume

V = total volume of working circle

v = volume of any block

Block	: Volume Sampling Error - Petersburg Working Circle - : National Forest Commercial Forest Land		
	: Accessible	: Inaccessible	: Total CFL
	: <u>Percent</u>	: <u>Percent</u>	: <u>Percent</u>
1. Farragut	: 30.5	: 40.3	: 24.3
2. Thomas	: 19.6	: 25.2	: 15.4
3. Bradfield	: 22.2	: 29.9	: 17.7
4. Turnabout	: 29.4	: 53.8	: 25.8
5. Petersburg	: 20.5	: 33.6	: 17.5
6. Kake	: 26.5	: 33.6	: 21.0
7. Duncan	: 29.0	: 32.3	: 21.6
8. Zarembo	: 18.9	: 32.9	: 16.4
9. Wrangell	: 13.8	: 24.9	: 12.1
10. Anita Bay	: 26.5	: 65.8	: 24.9
11. Kadake	: 21.9	: 40.3	: 19.1
12. Tebenkof	: 18.7	: 28.5	: 15.7
13. Rocky Pass	: 37.0	: 51.0	: 29.9

With each subdivision of the Working Circle, the percentage error increases so that small volumes may have large sampling errors and therefore indicate only relative magnitudes.

COEFFICIENT OF VARIATION

The coefficient of variation as determined from the total field plots examined on commercial forest land was 52 percent. This was calculated on the basis of the net board-foot volume (Scribner) of live merchantable sawtimber trees.

TABLE OF SCRIBNER TO INTERNATIONAL $\frac{1}{4}$ -INCH RATIOS

Species	10" - DBH Group	Ratio ^{1/}
Western hemlock,	11.0" to 20.9"	1.16
Mountain hemlock and	21.0" to 30.9"	1.09
Sitka spruce	31.0" to 40.9"	1.05
	41.0" and larger	1.03
Alaska-cedar	all diameters	1.14
Western red cedar	" "	1.16
Lodgepole pine	" "	1.16
Hardwoods	" "	1.15

^{1/} Ratio for converting Scribner b.f. volume to International $\frac{1}{4}$ -inch b.f. volume at the per acre level.

AVERAGE FORM CLASS, 16-FOOT LOG

Species	:	Form class
Western hemlock	:	82
Mountain hemlock	:	82
Sitka spruce	:	82
Alaska-cedar	:	79
Lodgepole pine	:	75
Hardwoods	:	77

CAUSES AND TYPES OF CULL ^{1/}

Cull in living trees is largely due to decayed wood, but some may be due to sound defect from such causes as shake, crook, and sweep. Shake is the only sound defect that contributes appreciably to cull in the stands of Southeast Alaska. Loss of volume from burning, as found in large fire scars in other regions, is inconsequential in this rain forest. Sound cull from shake caused a loss of board-foot volume but was not considered a loss in cubic volume.

^{1/} Kimmey, James W.

1956. Cull factors for Sitka spruce, western hemlock and western red cedar in southeast Alaska. Station Paper No. 6, Alaska Forest Research Center.

Most board-foot cull and all cubic-foot cull was due to decayed wood. Decayed wood is of two types: "brown rot" and "white rot". In brown rot the casual fungi attack primarily the cellulose fibers; in white rot, the lignin content of the wood. Likewise, two general stages of decay were recognized in this study analysis. They are the early, or incipient, stage of decay and the late, or typical, stage.

In the incipient stage the affected wood is usually discolored and firm, but often somewhat softened and weakened. Low grades of lumber may be manufactured from such wood. This wood may also be used in pulp making, though some weakening of fiber results when incipient decay of the brown rot type is used. Wood in the typical stage of decay will not make lumber, even of low grade, and the typical stage of brown rot makes wood unsuited for pulp of any kind. Part of the wood containing typical decay of the white rot type, however, may be used in pulp making but with considerable loss of yield.

In the southeast Alaska study both brown and white rot, in both the incipient and typical stages, were considered to be cull; therefore, the cull factors discount all decayed wood. In certain uses for timber it may be desirable to know the type of rot or stage of decay likely to be found in the cull of a tree species. Table 1 shows for the various tree species the percentage of each type of rot in each stage of decay based on the cubic-foot volumes of cull found in the study trees.

Table 1.--Percent of white rot and brown rot in each stage of decay by tree species.

Tree species	White rot		Brown rot		All rot	
	Incip.	Typ.	Incip.	Typ.	Incip.	Typ.
Sitka spruce	27	73	39	61	37	63
Western hemlock	36	64	36	64	36	64
Western redcedar	77	23	57	43	77	23

If timber is to be used primarily for pulp, it will undoubtedly be desirable to know what percent of the total cull is caused by white rot and what part of the white rot is in the incipient stage of decay. Since all cubic-foot cull was caused by decay, the significance of each type of rot and each stage of decay in the total cull of a tree species can be read from table 2.

Table 2.--Percent of total cubic cull volume caused by each type of rot and stage of decay in each tree species.

Tree species	White rot			Brown rot		
	Incip.	Typ.	Total	Incip.	Typ.	Total
Sitka spruce	4	12	16	33	51	84
Western hemlock	22	40	62	14	24	38
Western redcedar	76	22	98	1	1	2

In western redcedar 98 percent of the total cubic cull was caused by white rot, of which 77 percent occurred in the incipient stage. In other words, more than three-fourths of the total cull in redcedar consisted of white rot in the incipient stage of decay--a type of cull material that may have limited use in both lumber and pulp manufacture.